

AMENDMENT TO THE CLAIMS

1.(Currently Amended) A method of determining and applying a heat treatment ~~to apply~~ to a structural member, ~~so~~ as to modify ~~the~~ a deformation ~~behaviour~~ behavior of the structural member when subjected to an applied stress, ~~the said~~ method comprising:

monitoring the structural member so as to generate monitored data;

simulating the deformation ~~behaviour~~ behavior of the structural member when subjected to the applied stress using the monitored data;

simulating the effect of at least one heat treatment upon ~~the at least part~~ at least a region of the structural member so as to determine a[[:]]

determining a suitable heat treatment to apply to ~~the at least part~~ at least the region of the structural member, to produce the to produce a modified deformation ~~behaviour~~ behavior; and

applying the suitable heat treatment to the structural member.

2.(Currently Amended) A ~~The~~ method according to claim 1, wherein ~~the simulation of said simulating of the deformation behavior comprises uses is performed using~~ a numerical modelling method.

3.(Currently Amended) A ~~The~~ method according to claim 1, wherein ~~the simulation of said simulating of the effect of at least one heat treatment uses is performed using~~ a numerical modelling method.

4.(Currently Amended) A ~~The~~ method according to claim 2, wherein the numerical modelling method comprises a finite elements method.

5.(Currently Amended) A ~~The~~ method according to claim 1, wherein ~~the heat treatment is simulated with a localised~~ said simulating of the effect of at least one heat treatment uses a localized heat source.

6.(Currently Amended) A-~~The~~ method according to claim 1, wherein ~~the heat treatment is simulated with~~ said simulating of the effect of at least one heat treatment comprises uses a moveable heat source.

7.(Currently Amended) A-~~The~~ method according to claim 1, wherein said determining of the suitable heat treatment is determined~~comprises determining the suitable heat treatment~~ such that ~~the a simulated temperature generated in~~of the structural member during said applying of the suitable heat treatment is less than ~~the a~~ melting temperature ~~for the material of the structural member.~~

8.(Currently Amended) A-~~The~~ method according to claim 1, wherein ~~each heat treatment is defined by a parameter and where~~said simulating of the effect of at least one heat treatment comprises~~comprises simulating the effect of a plurality of heat treatments by a number of heat treatments are simulated by varying the a heat treatment parameter to simulate the effect of the number heat treatments.~~

9.(Currently Amended) A-~~The~~ method according to claim 8, wherein the heat treatment parameter ~~is describes one of the a~~ travel speed of ~~the a~~ heat source, ~~the a~~ heat input of the heat source, ~~the a~~ heat intensity distribution of the heat source, or ~~the a~~ maximum temperature of the heat source.

10.(Currently Amended) A-~~The~~ method according to claim 1, wherein said determining of the suitable heat treatment is determined~~comprises determining the suitable heat treatment~~ automatically.

11.(Currently Amended) A-~~The~~ method according to claim 1, ~~wherein the method further comprises~~further comprising selecting one or more regions forming part of the structural member in accordance with the simulated deformationssaid simulating of the deformation behavior.

12.(Currently Amended) ~~A~~The method according to claim 11, wherein said selecting of the one or more regions comprises selecting the one or more regions ~~each region is selected in accordance~~ with a deformation property.

13.(Currently Amended) ~~A~~The method according to claim 12, wherein the deformation property is ~~selected from a~~ ductility, stress, strain, elongation ~~or, or a~~ fracture property.

14.(Currently Amended) ~~A~~The method according to claim 12 wherein ~~each region is selected at a location in the structural member~~ said selecting of the one or more regions comprises selecting the one or more regions in accordance with a threshold ~~in of~~ the deformation property.

15.(Currently Amended) ~~A~~The method according to claim 12, further comprising assigning a target threshold to the deformation property for each region.

16.(Currently Amended) ~~A~~The method according to claim 15, wherein said simulating of the deformation behavior of the structural member ~~further comprising~~comprises repeatedly:

simulating the deformation behavior of the structural member ~~having in accordance with the assigned deformation property~~ target threshold in each region;

comparing the simulated deformation behavior with a desired ~~behaviour; and, deformation~~ behavior; and

assigning a new target threshold and/or ~~new region(s);~~ selecting one or more new regions,
until the simulated deformation behavior is the desired deformation ~~behaviour~~ behavior is simulated.

17.(Currently Amended) ~~A~~The method according to claim 15, wherein the said determining of the suitable heat treatment is determined so as to produce ~~comprises~~ determining a heat treatment which produces a deformation ~~behaviour~~ behavior meeting the target threshold in each region.

18.(Currently Amended) A-The method according to claim 17, wherein said simulating of the deformation behavior of the structural member further comprising~~comprises~~ repeatedly:

simulating the deformation behavior of the structural member ~~having in accordance with the assigned deformation property~~target threshold in each region;

comparing the simulated deformation with a desired ~~behaviour; and, deformation behavior;~~
and

assigning a new target threshold and/or ~~new region(s);~~selecting one or more new regions,
until the ~~desired deformation is simulated, wherein the deformation behaviour produced is the desired deformation behaviour~~ simulated deformation behavior is the desired deformation behavior, the desired deformation behavior being the deformation behavior meeting the target threshold in each region.

19.(Currently Amended) A-The method according to claim 11, wherein ~~the selection of each region is performed~~ said selecting the one or more regions comprises automatically selecting the one or more regions.

20.(Currently Amended) A-The method according to claim 11, wherein said ~~further comprising~~ simulating of the deformation ~~behaviour~~behavior of the structural member comprises simulating the deformation behavior of the structural member in the ~~a~~ heat treated condition.

21.(Currently Amended) A-The method according to ~~claim 20~~claim 20, further comprising ~~repeating the method to identify further~~ selecting one or more additional regions for subsequent heat treatment in accordance with said simulating of the deformation behavior of the structural member in the heat treated condition.

Claim 22 (Cancelled).

23.(Currently Amended) A-The method according to ~~claim 22~~claim 1, wherein ~~the determined~~

~~heat treatment(s) — are applied using a localised~~said applying of the suitable heat treatment comprises utilizing a localized, controllable heat source.

24.(Currently Amended) A-~~The method according to claim 23, wherein the heat treatment(s) are applied using~~said applying of the suitable heat treatment comprises utilizing a laser or induction coils.

Claim 25 (Cancelled).

26.(Currently Amended) A-~~The method according to claim 25, wherein the~~claim 1, wherein said determining the suitable heat treatment comprises selecting a heat treatment for each region is selected — the at least one region of the structural member from a group of predetermined heat treatments for the structural member.

27.(Currently Amended) A-~~The method according to claim 25, wherein the~~claim 1, wherein said applying of the suitable heat treatment comprises applying the suitable heat treatment to a structural member includes — including at least two substructural members welded together.

28.(Currently Amended) A-~~The method according to claim 25, wherein the structural member is~~claim 1, wherein said applying of the suitable heat treatment comprises applying the suitable heat treatment to a vehicle impact member.

Claims 29 – 42 (Cancelled).

43. (New) A computer readable medium encoded with a computer program for determining a heat treatment to apply to a structural member so as to modify a deformation behavior of the structural member when subjected to an applied stress, the computer readable medium causing a computer to execute a method comprising:

monitoring the structural member so as to generate monitored data;
simulating the deformation behavior of the structural member when subjected to the applied stress using the monitored data;
simulating the effect of at least one heat treatment upon at least a region of the structural member; and
determining a suitable heat treatment to apply to at least the region of the structural member to produce a modified deformation behavior; and
controlling application of the suitable heat treatment to the structural member.